Codling Moth Mating Disruption Efficacy in 2023

Kaitlin Quinn
North Jersey IPM Program Associate, Rutgers University

Throughout the state of New Jersey, more tree fruit growers have been adopting the practice of using mating disruption to control orchard pests. Examples of mating disruption products available in apples include codling moth, Oriental fruit moth, dogwood borer and obliquebanded leafroller. Mating disruption works by creating a synthetic plume of sex pheromone in the orchard, which disorients males of the species it is specifically designed for, and greatly reduces their ability to find females. If the males are unable to find females of the species, they will not be able to mate, which reduces populations and the need for traditional control methods.

The codling moth is one of the most significant pests of apples. Adults in the orchard mate and the female will lay her eggs on the leaves and fruit. Once the larvae hatch, they burrow through the fruit into the core to feed (Figure 1). This damage makes the fruit unmarketable and if not discovered before harvest, it increases the chances of fruit rot in storage. In New Jersey, this pest has up to 3 generations per year. In some seasons there is a long dragged-out 2nd generation instead of a true 3rd generation. Treatments for the last generation typically coincide with harvest of September ripening apple cultivars, thus presenting a control issue due to limited low PHI pesticide options for Codling Moth. There are also challenges associated with this for pick-your-own operations. Since mating disruption reduces the needs for traditional insecticides, it may be a good option to resolve this issue.

Figure 1. Codling Moth larva and damage in apple. Photo Credits: Kaitlin Quinn

Mating disruption is typically recommended for blocks that are at least 5 acres, uniform and square to minimize border edges. In our North Jersey Tree Fruit IPM Program there are many farms that do not meet these qualifications, almost all our orchards are not perfectly square, and most have woodland on one or more sides. Some researchers are beginning to investigate the efficacy of mating disruption in blocks that do not meet these standards, or what some would call non-compliant blocks. At the moment, not enough data has been collected to reach any definitive conclusions. Based on the North Jersey Tree Fruit IPM Program's 2023 data alone, it seems that mating disruption may be a useful tool in blocks under 5 acres, but more research needs to be done to confirm these observations.

Materials and Methods

The Rutgers University North Jersey Tree Fruit IPM Program's 2023 data comes from the 28 farms in the program. Out of 28 farms, 4 farms had under 5 acres of apples and applied codling moth mating disruption. Three of these farms had 4 acres of apples and one had 1 acre of apples. 6 farms had over 5 acres of apples and used codling moth mating disruption and 18 farms did not use mating disruption. The 18 farms that did not use mating disruption used degree-day models and traditional insecticides to control Codling Moth. Growers using mating disruption used either Isomate CM/OFM TT at a rate of 200 dispensers per acre or CIDETRAK®

CM-OFM COMBO™ MESO™ at a rate of 30-38 dispensers per acre. All farms were scouted on a weekly basis for codling moth fruit injury, a total of 200 apples were scouted on each visit. Each farm had codling moth traps (Figure 2) placed in the upper 1/3rd of the tree's canopy and each trap had a 10X Suterra codling moth pheromone lure; these traps were checked on a weekly basis while scouting.

Figure 2. Codling moths in pheromone trap. Photo Credit: Steve Schoof, NC State

Results

Figure 3 presents trapping results from the 4 farms in the program that were under 5 acres and using mating disruption. We only had farms in Morris, Warren and Hunterdon counties that fit these qualifications. We caught one codling moth on May 27th in Hunterdon County and one on August 26th in Morris County. No codling moth fruit injury was found on blocks under 5 acres using mating disruption.

Codling moth trap capture results in farms >5 acres are shown in Figure 4. The data comes from the 6 farms in the program that are using mating disruption on their traditionally compliant blocks. Only Morris, Mercer, Hunterdon, and Bergen counties had farms that fit these qualifications. On June 3rd one farm in Morris County had a trap capture of two Codling Moths. No codling moth fruit injury was found on farms over 5 acres using mating disruption.

Farms that did not use mating disruption utilized degree day models to time their traditional insecticide applications to control Codling Moth populations. Only Middlesex, Morris, Hunterdon, Warren, and Sussex counties

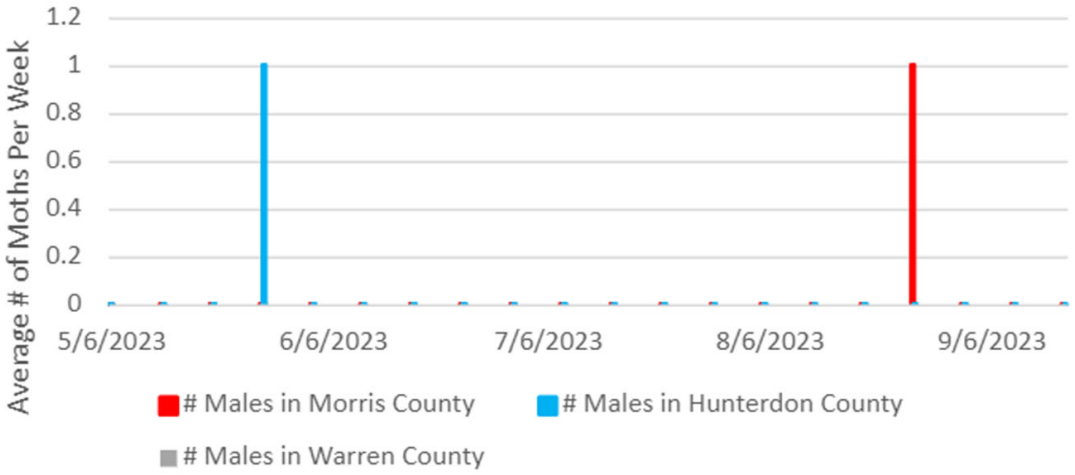

Figure 3. Weekly codling moth trap captures on four farms <5 acres using mating disruption

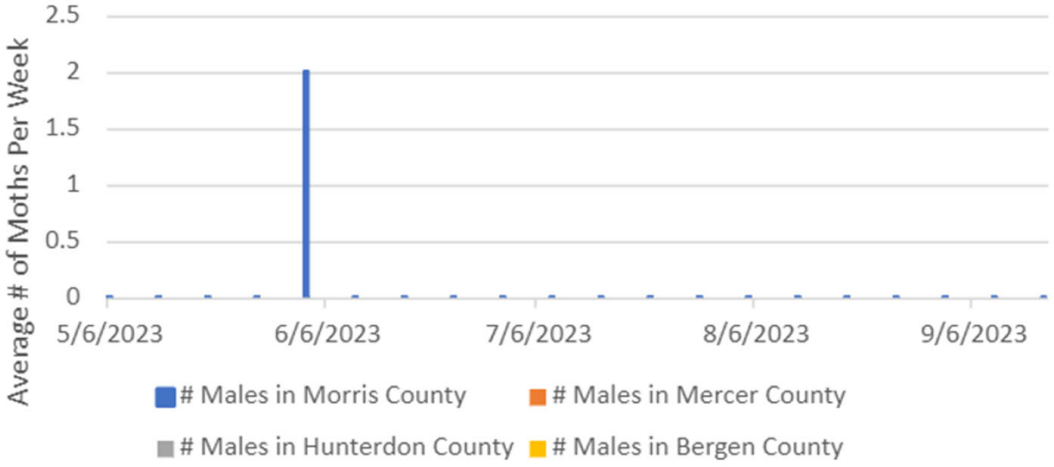

Figure 4. Trap captures on farms >5 acres using mating disruption.

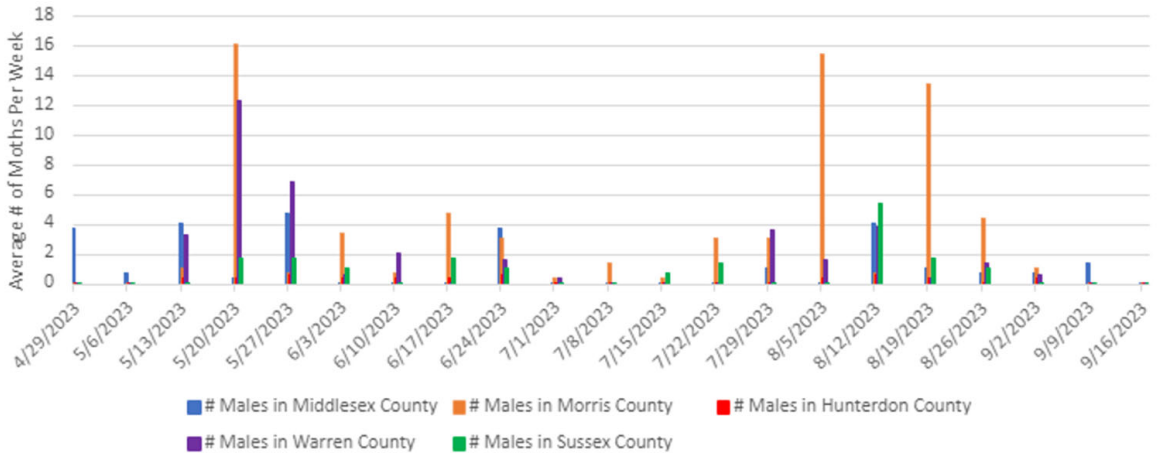

Figure 5. Trap captures on farms not using mating disruption.

had farms that fit these qualifications. All traps at these farms consistently caught Codling Moth throughout the season with the highest total trap capture being 40 moths in one week (Figure 5).

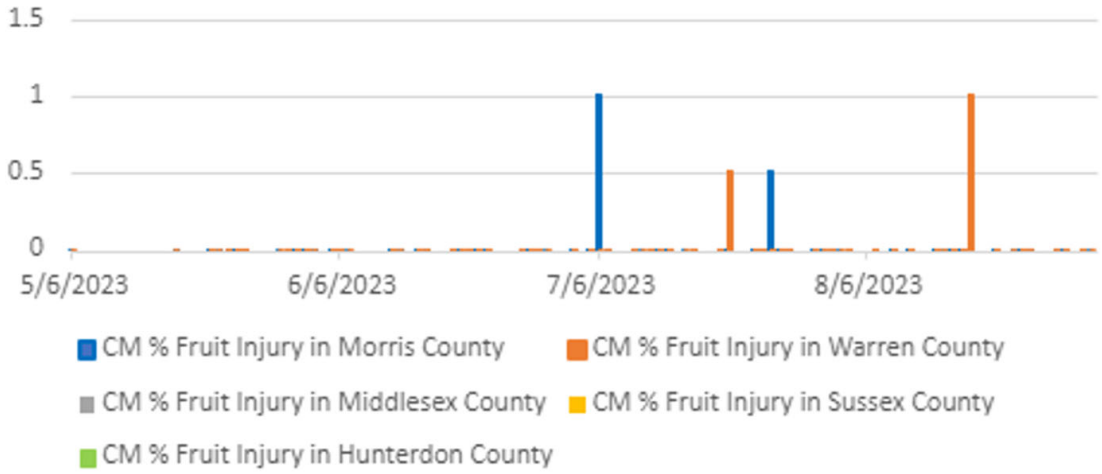

Figure 6. Percent fruit damage on farms not using mating disruption

As shown in Figure 6, there was some Codling Moth fruit injury from July through August in Morris and Warren counties.

Conclusion

The data show a trend that not only is mating disruption effective in traditionally compliant blocks, but it may also become a useful tool in blocks under 5 acres. Since this is based on only one year of data alone, more research needs to be done on the efficacy of mating disruption in blocks under 5 acres before this can confidently be recommended as a tool to growers.